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A Comparison of Good and Poor Grade Four Readers on Comprehension of Perceptual Connectives

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Degree for which thesis was presented — Grade pour lequel cette thèse fut présentée

Master of Education

Year this degree conferred — Année d'obtention de ce grade

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A COMPARISON OF GOOD AND POOR GRADE FOUR READERS ON COMPREHENSION OF PERCEPTUAL CONNECTIVES

by

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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF MASTER OF EDUCATION

DEPARTMENT OF ELEMENTARY EDUCATION

EDMONTON, ALBERTA

FALL, 1981

THE UNIVERSITY OF ALBERTA

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TITLE OF THESIS: A COMPARISON OF GOOD AND POOR GRADE FOUR READERS ON COMPREHENSION OF PERCEPTUAL CONNECTIVES

DEGREE FOR WHICH THESIS WAS PRESENTED: Master of Education

YEAR THIS DEGREE GRANTED 1981

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ABSTRACT

There are many linguistic cues that aid the reader in the synthesis of discourse relationships when involved in comprehension of written information. This study focussed on one type of these linguistic cues, the logical connectives. The specific logical connectives investigated were the perceptual connectives which involve temporal and spatial relationships.

The major purposes of this study were to compare good and poor readers on use of perceptual connectives in recalls and on the nature of information recalled from passages that did or did not contain perceptual connectives.

Forty grade four subjects from schools within the Edmonton Catholic School District participated in the study. They were selected on the basis of comprehension scores on the Gates-MacGinitie Reading Test, Level C, Form 2, Canadian Edition (1980) and non-verbal scores on the Canadian Lorge-Thorndike Intelligence Test, Level B, Form 1 (1967) Subjects formed two equal groups of good and poor readers according to their comprehension scores. I.Q. was held constant.

Two test passages from the Standard Reading Inventory Test (McCracken) (1966) were selected at instructional level for the poor readers and modified so that one version of each contained perceptual connectives and one version did not. Each subject was presented with a passage that had the connectives present and a passage that did not contain connectives. Following silent reading of each passage, the subject was requested to give a verbal recall.

The recalls were tape recorded and later transcribed into protocols for analysis. The recall protocols were divided into clausal units and then the clausal units were categorized according to the type of information recalled (text specific, text entailed, text erroneous, or text external). The analysis of categories was based on the Semantic Potential Theory of Language (Fagan, 1978, 1980). The recalls were also examined for perceptual connectives stated by each subject.

The statistical analysis of the data included a t-test for independent means, correlations, and two-way analysis of variance with repeated measures.

Findings indicated that there were no significant differences between good and poor readers in the nature of information recalled or in their use of perceptual connectives in recalls after reading passages with and without connectives. The type of passage, however, did have a significant effect on the total number and the number of different perceptual connectives given in the recalls. More perceptual connectives were given if they were present in the passage read.

It was concluded that an active reader can abstract and reconstruct meaning if the material is at an appropriate reading level. Perceptual connectives, whether implicit or explicit, aid in synthesis of temporal and spatial relationships in connected discourse. Use of connectives in discourse facilitates their increased use in recalls. Implications pertaining to the findings and conclusions were included for researchers and for classroom teachers, as well as suggestions for further research.

ACKNOWLEDGEMENTS

It is with sincerity that I wish to acknowledge the assistance and encouragement given me during the course of this study. Grateful appreciation is especially extended to Dr. Grace Malicky, my supervisor, who was always available to provide guidance and support.

Sincere thanks are expressed to the members of my examining committee, Dr. Jean Robertson and Dr. Clement King, for their thoughtful questions and helpful suggestions.

The assistance of Dr. Susan Therrien and The Division of Educational Research in the statistical analysis of the study is appreciated.

The cooperation and the assistance of administrative personnel, teachers, and children within the Edmonton Catholic School District, where testing was done, are gratefully acknowledged.

Finally, a special tribute is paid to my husband, Walter, for his understanding, encouragement, and moral support throughout the course of this study; and to my children, Dwayne, Cheryl, and Marvyn, whose presence reminded me that "life is not all books".

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CHAPTER I

INTRODUCTION

Introduction and Problem

In psycholinguistic theories reading is a process of communication between author and reader. The essential strategy is selecting cues from printed language and relating these cues to background knowledge in order to interpret the author's message. A meaningful interaction between reader and author results in comprehension of the printed language and comprehension is considered the goal of reading.

According to Goodman (1970) the reader processes and coordinates simultaneously three types of information: graphic, syntactic, and semantic. Such processing entails a number of cognitive and linguistic processes. A key process is synthesis, for an adequate word vocabulary alone does not ensure comprehension of complex sentence structures or connected discourse (Luria, 1966).

Research on comprehension of discourse was begun by Bartlet in 1932. Tierney, Bridge, and Cerra (1979) state "he concluded that memory for discourse is an active process of reconstruction in which the present knowledge system of the individual forms a schema that interacts with the new information in the text" (p. 542). However, between Bartlet's pioneering work and the early 1970's, there were few other studies of

connected discourse. A number of recent investigations (Ferry, 1975; Kintsch and van Dijk, 1978; Drum, 1978; Furniss, 1978; Marshall and Glock, 1978; Tierney, Bridge, and Cerra, 1979; Irwin, 1980; Barnitz, 1980), though, have examined the effect of structure among the ideas presented in a text on what the reader comprehends and retains from the text.

Fagan (1978), who developed the Semantic Potential Theory of Language to analyze the oral and written language of nine, ten, and eleven year old children, suggests that "perhaps the most challenging avenue to persue is the reception half of the theory. The cues which the receiver selects from a language utterance and the relationship of these cues to meaning should contribute greatly to the knowledge of language comprehension" (p. 188). In order to determine what kind of information readers select from text as well as how they organize it, Fagan (1978) suggested that two areas be examined: (a) nature of the information recalled; and (b) recall of logical connectives. The present study is concerned with this area of research.

According to Fagan (1978) there is evidence that information in a text larger than a sentence is interrelated. The linguistic cues used to signal interrelatedness in text are conjunctons, referential terms (pronouns, synonyms, etc.), and staging or the positioning of information within oral or written language. Conjunctions are referred to by Fagan as logical connectives as they convey the logical relationships that occur between informational units. Thus they aid in synthesis of meaning by relating informational units. Fagan identified eleven different types

of logical connectives which Beebe and Malicky (1980) subsequently categorized into three groups:

1. descriptive or "what" connectives
2. explanatory or "how" and "why" connectives
3. perceptual connectives which emphasize temporal and spatial dimension of events.

Beebe and Malicky (1980) investigated the relationship between reading processes used by clients at entry into a remedial reading program and their gains in silent reading comprehension while in this program. Included in their findings was that "those students with the lowest competency in the understanding of time and space relationships were the least likely to achieve significant gains in reading due to intensive training" (Beebe and Malicky, 1980, in press).

Other studies involving understanding of connectives have been carried out using subjects in high school and college (Neimark and Slotnick, 1970; Ferry, 1975; Townsend and Bever, 1978; Marshall and Glock, 1978) while some have involved subjects from pre-school to grade one (Bever, 1970; Corrigan, 1975; Coker, 1978). Some have also examined developmental patterns in the understanding of logical connectives (Robertson, 1968; Amidon, 1976; Neilsen, 1978; Sternberg, 1979). A few studies have investigated the ability of good and poor readers to understand connectives (Pearson, 1974; Neilsen and Braun, 1978; Zinn, 1979).

The majority of these studies have dealt with conditional or causal connectives. Most have looked at a variety of connectives without focussing on any specific type of connective. However, this study

focusses on perceptual connectives where the logical text relation involved is perception of time and space relationships. It attempts to determine the difference between good and poor readers at the elementary level in their use of perceptual connectives and in the nature of information recalled from passages with and without these connectives.

Purposes of the Study

There are many linguistic cues which aid the comprehension of written language. This study investigates one of these, logical connectives, and involves good and poor readers in grade four. The major purposes of this study are to compare their performance on: (a) use of logical connectives in recalls; and (b) the nature of information recalled from passages that contain or do not contain connectives. The logical connectives involved are the perceptual connectives which aid in synthesis of time and space relationships.

One passage characterized by the absence of perceptual connectives and another passage characterized by the presence of perceptual connectives were presented to the subjects which they were requested to read silently and then to recall the information read. These unaided recalls were divided into clausal units and the units categorized according to the type of information recalled. The number of units in each category was compared for good and poor readers. There was also a comparison between groups for the total number of connectives and the number of different connectives recalled.

Definition of Terms

Following are the definitions that are associated with the key terms used in this study.

Connected Discourse (or Discourse)

Written material containing more than two sentences characterized by the relationships and connections of syntactic and semantic elements.

Perceptual Connectives

Linguistic indicators which signal discourse relationships; specifically, the conjunctions which signal temporal or spatial relationships between informational units.

Synthesis

The combining or relating of key elements or ideas in connected discourse which results in a reconstruction of meaning.

Type of Passage

The type of passage that is presented to the subjects for silent reading and recall.

1. Passage modified to include perceptual connectives.
   (C+, + perceptual connectives)
2. Passage modified to exclude perceptual connectives.
   (C-, - perceptual connectives)

Recall Protocol

Verbal recall of a passage read which is recorded and transcribed for analysis. It is a measure of spontaneously produced information.

Good Readers

Those subjects who achieve between the 70th and the 90th percentile on the comprehension subtest of the Gates-MacGinitie Reading Test.

Poor Readers

Those subjects who achieve between the 10th and 30th percentile on the comprehension subtest of the Gates-MacGinitie Reading Test.

Hypotheses

The following null hypothesis were formulated and investigated.

Hypothesis 1

For the number of text specific units recalled, there is no significant:

(a) main effect of reading achievement groups

(b) main effect of types of passages

(c) interaction between reading achievement groups and types of passages.

Hypothesis 2

For the number of text entailed units recalled, there is no significant:

(a) main effect of reading achievement groups

(b) main effect of types of passages

(c) interaction between reading achievement groups and types of passages.

Hypothesis 3

For the number of text erroneous units recalled, there is no significant:

(a) main effect of reading achievement groups

(b) main effect of types of passages

(c) interaction between reading achievement groups and types of passages.

Hypothesis 4

For the number of text external units recalled, there is no significant:

(a) main effect of reading achievement groups

(b) main effect of types of passages

(c) interaction between reading achievement groups and types of passages.

Hypothesis 5

For the total number of perceptual connectives recalled, there is no significant:

(a) main effect of reading achievement groups

(b) main effect of types of passages

(c) interaction between reading achievement groups and types of passages.

Hypothesis 6

For the number of different perceptual connectives recalled, there is no significant:

(a) main effect of reading achievement groups

(b) main effect of types of passages

(c) interaction between reading achievement groups and types of passages.

Limitations and Delimitations

1. The subjects may not be accustomed to giving an unaided recall following the reading of a passage. In addition, the presence of a tape recorder and the individual setting with a one-to-one correspondence between subject and researcher may create an atypical reading situation.

2. The experimental population is grade four students in the Edmonton Catholic School District and findings are applicable to this group.

3. The language cues, i.e. perceptual connectives, selected for this study represent only a small number of language cues which signal relationships in written language.

4. Although perceptual relationships may be recalled, it is possible that they are not explicitly stated in oral recall.

5. Recall as a measure of comprehension is controversial in current research. Considerable research is still needed to assess the relative contributions of comprehension versus retrieval processes.

6. This study is limited to an investigation of conjunctions which indicate temporal and spatial relationships. Prepositions were not included. This decision was made because of the focus on synthesis in the study. Major interest was in synthesis of relationships across rather than within clausal units since this was a study of connected discourse.

Significance of the Study

The results of this study are significant to the reception half of the Semantic Potential Theory of Language (Fagan, 1978) which addresses the question of how text relation cues are utilized as an aid to comprehension. The results provide more information about the nature and organization of information selected for recall. In particular the significance of perceptual connectives in synthesizing information in discourse is examined.

The versions of the passages presented have implicit and explicit connectives and an attempt is made to determine the effect of this variable on comprehension. Thus the findings of this study may have implications for improving the readability of texts and reading tests. The results of research such as this should influence the writers of instructional reading materials so that the materials are more comprehensible to children.

Contrasting good and poor readers also has pedagogical implications. Determining how they do and do not diverge in the comprehension process should be useful in designing reading comprehension instruction for the beginning reader or for the reader requiring remediation. Therefore examining the characteristics of high and low achieving readers as this study does, seems prudent, both for understanding the nature of the reading comprehension process and for highlighting issues of concern for future research.

Plan of the Investigation

Chapter I contains the introduction and statement of the problem, purposes of the study, definition of terms, and hypotheses that guide the investigation. Limitations and delimitations, and the significance of the study were also discussed.

In Chapter II, a review of related literature and research is presented. The design of the study is detailed in Chapter III. Chapter IV contains the findings of the study. Included also in this chapter is a discussion of the results. A summary of the study, the conclusions and implications, and suggestions for further research are presented in Chapter V.

CHAPTER II

RELATED LITERATURE

Introduction

In this chapter selected literature is reviewed to provide a theoretical framework for investigating the effects of logical connectives in connected discourse on the nature of information given in free recall by good and poor readers. Research concerning discourse with respect to cognitive processing and the linguistic indicators which aid in the comprehension of discourse relationships is drawn mainly from the fields of reading and psycholinguistics. However, Luria's theory in neuropsychology is also cited. Some recent investigations which have compared the comprehension processes of good and poor readers are included in this chapter as well.

Cognitive Processing in Discourse

Luria's (1966) "theory of the cerebral organizations of human psychological processes" (p. 72) provides a theoretical framework for the cognitive processing involved in comprehension of written language. He concluded that there was "strong evidence for distinguishing two basic forms of integrative activity in the cerebral cortex" (Luria, 1966, p. 50). These he identified as "simultaneous synthesis" and "successive

synthesis". In simultaneous synthesis stimuli are perceived simultaneously in the brain. In reading, he proposes that the parts of a sentence (e.g. noun group, verb group) must be synthesized simultaneously to grasp their fundamental relationship. In successive synthesis stimuli are perceived in sequential order. This process is involved when reading more complex written materials such as a passage.

Latham (1973) sums up the implications of Luria's theory for comprehension of written language by saying "individual words representing verbal concepts and signalling syntactic functions, semantic constraints, and/or situational information are synthesized to form meaningful word groups. These word groups are interrelated to establish functional relationships within sentences. Sentences are synthesized to reconstruct coherent discourse" (p. 124). More recently, McLeod (1978) has also stated that "cognitive processing is viewed as prerequisite and corequisite for reading comprehension" (p. 50).

Support for cognitive processing is provided by Pearson's (1974) study, designed to assess linguistic variables which might affect the way in which children comprehend verbal data when they read. He considered three theoretical positions in explaining the data obtained: the readability hypothesis, which claims that sentence length and complexity contribute to comprehension difficulty; the deep structure model, based upon transformational-generative grammars; and the chunk model. The chunk model claims that comprehending consists of synthesizing propositions into larger semantic units rather than analyzing complex units into single propositions. If the surface form of a statement is synthesized, comprehension is facilitated. If the surface form is broken

down, comprehension is impeded. The evidence favored the chunk model as a model of the processing of verbal data, particularly with respect to the variable of the effects of syntactical complexity on children's comprehension of causal relations. Pearson (1974) states "the main conclusion to be drawn from the recall study is that, in order to store a causal relation, a subject virtually cannot help but store it in a unified, subordinate chunk" (p. 187).

Based on results of his study, he suggested follow-up studies to see what happens to comprehension when selected statements are placed in paragraph or passage context and applied to other classes of semantic relations such as time. These suggestions are incorporated in this study.

Although oral reading may be quite proficient, the reader may be unable to retell the story. This suggests that syntactic/semantic processing of single sentences is necessary but may not be sufficient to ensure that information from one sentence will be integrated with information from preceding and subsequent sentences to yield meaning for a passage. The reader must also be able to follow a sequence of ideas when reading and be "able to understand the relationships among details in passages read" (Malicky, 1980, p. 2). Unless readers are able to perceive and synthesize the relationships between two or more pieces of information given in a passage, they will not arrive at an overall meaning.

According to Henry (1974), synthesis is the discovery of the relation of "joining or a relating things seemingly existing separately" (p. 9). Relation entails many acts of joining (bringing together, comparing, generalizing, classifying) and synthesis in reading implies a

search for connectedness. This connectedness is facilitated by logical connectives. Thus synthesis in reading is a creative act for what comes out of the joining goes beyond the elements of the material read. "Only when we try to communicate the ideas of a passage to ourselves or to others or to relate to another work or passage do we determine what meaning is really ours" (Henry, 1974, p. 17).

That readers remember the gist of what they read in free recall productions is supported by the findings of researchers such as Gomulicki (1956), Fillenbaum (1966), Drum (1974), and Kintsch (1974). Since "gist is the product of selecting and rearranging elements of the text into a summary of the content" (Drum and Lantoff, 1977, p. 1) synthesis is occurring. "The rearrangement and integration of the selected text information is believed to be based on the reader's prior knowledge; the anticipation of what the reader expects to find; and the way in which the text is structured as well as the reader's ability to interrelate items within and across sentences and paragraphs" (Beebe and Malicky, 1980, in press).

Based on their research to describe the system of mental operations that underlie the processes occurring in text comprehension and in the production of recall and summarization protocols, Kintsch and van Dijk (1978) state that "recall protocols are texts in their own right" (p. 374). Following is a summary of their findings that are relevant to free recall of text.

1. The subjects will try to produce a new text that satisfies the pragmatic conditions of a particular task in an experiment or the requirement of effective communciation in a more natural context.

2. The operations involved in discourse are so complex that the subject will be unable to retrieve at any one time all the information that is in principle accessible to memory.

3. Protocols will contain information not based only on what the subject remembers from the original text, but consisting of reconstructively added details, explanations, and various features that are the result of output constraints characterizing production in general.

4. Reproduction (or reconstruction) of text is possible in terms of different lexical items or larger units of meaning. (Kintsch and van Dijk, 1978, pp. 374-375).

Influenced by Bartlet's (1932) experiments which yielded data that expectations from past experiences influenced the subjects' perception of material, and that recall was not merely reduplicative but an active reconstruction, Gomulicki (1956) undertook a series of experiments on the recall of meaningful verbal material. His subjects were adults who had secondary education or were university students or graduates. Thirty-seven prose passages narrative in nature and increasing in length were used. He found that most subjects would reproduce nearly all of the short passages. However, as the passages lengthened, there were more omissions. Importance of information became a criterion for recall as evidenced by the close correspondence between its contribution to the total meaning of the passage and the frequency with which it was represented in production. This showed that omissions reflected an active process. This selection and organization of stimulus material was termed by Gomulicki (1956) as an "abstractive process in recall" (p. 89). In Fillenbaum's (1966) study, data revealed that even errors in recall of meaningful material are more likely to be meaning-preserving than meaning-changing.

Bransford and Johnson (1972) manipulated the availability of prior knowledge in order to assess its influence on the subjects' ability to comprehend and remember linguistic materials. Subjects in high school were presented with passages and asked to recall the information heard. For the experimental purposes they were divided into groups of Context Before, Partial Context, No Context, and Context After. Three subsequent experiments were similar in design. Their findings indicate that comprehension ratings of the groups presented with the topic or context before the passages were heard, were higher than for the other groups. However, they also state that "knowledge of the topic of a passage may be neither necessary nor sufficient for optimal comprehension. In order for prior knowledge to aid comprehension it must become an activated semantic context" (Bransford and Johnson, 1972, p. 724). The process by which prior knowledge helps subjects to create contexts that can be used to comprehend passages is referred to by Bransford and Johnson (1972) as a "reconstructive process".

Although Bartlet's (1932) hypotheses concerning comprehension of prose processing are known as constructive, a process involving an interaction between text and the knowledge of the comprehender, and reconstructive, a process of inferring the past rather than reproducing stored traces of past experiences, it appears that these terms are not distinguished by some researchers. For example, Bransford and Johnson's (1972) use of the term "reconstructive" is similar to Bartlet's (1932) "constructive". The data from Frederiksen's (1975) study also support Bartlet's (1932) constructive model. Frederiksen's (1975) study was

similar to that of Bransford and Johnson (1972) where he investigated the effects of context on comprehension.

Tierney, Bridge, and Cera (1979) noted in their study that discourse processing operations of children were both abstractive and constructive where the readers glean relevant units from the text, summarize them, and process the input in association with their background kowledge for meaningful interpretation. They claim that the nature of the readers' organizing procedures can be assessed by analyzing a passage and comparing a subject's verbal recall of text to the structure of the passage.

Before the last decade research into discourse comprehension did not receive much attention but it has been given impetus through psycholinguistic research. Since it is still a developing field of research, a need exists for more explorations with comprehension of discourse. This was suggested by the members of the National Institute of Education Conference on Studies in Reading (Miller, 1976). Therefore in this study comprehension at the passage level rather than at the sentence level is investigated.

Although the recent research at the discourse level has resulted in development of a number of discourse analyses techniques, the analysis developed by Fagan (1978, 1980) within the Semantic Potential Theory of Language is used in this study. This analysis has been found useful in defining variables in oral (Fagan, 1978) and written (Forster, 1978; Adams, 1979; Zinn, 1979) language samples.

Linguistic Processing of Good and Poor Readers

Although data from Pearson's (1974) study did not support the deep structure model for comprehending verbal data, he did give credence to transformational-generative grammars as devices for representing the grammatical relations occurring in language. According to Goodman (1970) syntactic/semantic processing of the linguistic cues in written material is necessary for comprehension. This is suported by studies such as Cromer's (1970), Weinstein and Robinovitch's (1971), and Isakson and Miller's (1976) which have indicated that students may fail to comprehend because of inability to perceive these relationships between the words in a passage. The subjects in their studies were good and poor readers.

Cromer (1970) identified and compared two groups of poor readers: the deficit group who experienced comprehension difficulty because of a deficiency in vocabulary and word identification skills; and a difference group whose word identification skills were commensurate with good readers but who did not adequatey comprehend sentences or passage meaning. In his study the poor readers were subdivided into these groups on the basis of their vocabulary scores. The difference group was matched with a group of good readers.

The subjects were male college freshmen and sophomore students. Sets of sentences were presented to them in four different modes; regular sentences, single words, meaningful phrases, and fragmented word groupings. Data indicated that the deficit poor group did not respond in the same manner to changes in modes of presentation as did the difference poor group, and also did not do as well under the phrases condition.

"The finding that good and poor readers did not differ significantly on single words lends support to the notion that these accomplished readers do not differ in their ability to identify words but differ rather in their organization or understanding of the words they identify" (Cromer, 1970, p. 179).

Weinstein and Robinovitch (1971) used good and poor readers in grade four in their study to determine whether syntactic structure facilitates recall in good readers and whether this effect exists in children who are poor readers. Under conditions of ordered recall, the children were asked to learn four sentences, two of which were structured and two, unstructured. Only the presence of syntactic structure distinguished the two kinds of material. The difference between the good and poor readers on the structured lists was significant whereas the performance on the unstructured lists did not differentiate the good readers from the poor readers. They concluded that "the difference between the two groups of readers is their ability to make use of the information inherent in the grammatical structure of a sentence" (Weinstein and Robinovitch, 1971, p. 30).

Similarly Isakson and Miller (1976) used fourth grade children equivalent on word identification skills but differing in comprehension ability to determine whether sensitivity to syntactic and semantic cues differs between good and poor comprehenders. Their findings indicate that good readers made more errors when they encountered violations of language constraints. The reading of poor comprehenders was not affected by the presence of semantic and syntactic violations. "Instead of using semantic and syntactic cues to integrate the meanings of individual

words they treat each word as an individual entity" (Isakson and Miller, 1976, p. 191). That poor readers are more concerned with individual word structures is also supported by the findings of Stanovitch and West (1979). Thus investigators have found that good comprehenders are more effective in their use of syntactic elements to synthesize meaning.

Kolers (1975) suggests that the good reader does not try to respond to the structure of words but uses language structure to anticipate meaning. Perfetti and Goldman (1976), who worked with third and fifth grade good and poor comprehenders, also state that reading comprehension is a special case of language comprehension.

Although results from such recent investigations suggest that good and poor comprehenders may differ in text organization processes, there are also indications that similar comprehension strategies may be used by different ages and abilities. Ryan and Semmel (1969) noted that the same basic strategies were used by beginning as well as mature readers. Sullivan (1973) analyzed comprehension errors of 526 good and poor readers in grade six and grade eight. She found that they made similar types of errors in processing factual and conclusive statements. Thus both types of readers appeared to use the same strategies in sifting out, organizing, and matching information. Such findings support Thorndike's (1973) conclusion that different comprehension skills overlap and are part of a larger factor called reasoning in reading.

In Miller and Hosticka's (1978) investigation, twenty test items based on logical structures were read to grade four good and poor comprehenders. Their task was to identify from the set of three choices the one that correctly completed the thought. The high comprehenders

were not more able to understand logical connectives than were their low comprehending counterparts.

Due to these differing perspectives regarding good and poor readers' comprehension abilities, there appears to be a need for more investigations in this area. Therefore contrasting different achievement groups, as is done in this study, may give a more complete understanding of their functioning relative to the interrelationships of cognitive and linguistic processes necessary for discourse comprehension.

Relationship of Logical Connectives to Comprehension

Recently several studies have investigated the relationship of text structure and reading comprehension. The structure of text specifies the logical connections among ideas. MacGinitie (1975) pointed out that "much of the problem of understanding a written passage often depends on logical relations among the facts given by a sentence or scattered among different sentences" (pp. 22-23) and has stressed the need to consider sentence interrelationships.

In a passage "certain words carry more of a meaning load than others" (Marzano, 1978, p. 729) and are the linguistic aids for synthesizing meaning by relating informational units. They not only link major ideas together, they also define the relationship between those ideas. Thus understanding of logical connectives is essential to the comprehension of written material. There are two general categories; those which are logical connectives and refer to thought, and those which

are referential connectives and refer to specific words. In this study, it is the logical connectives which are considered.

Ferry (1975), who utilized the Cloze procedure with students in grade ten, analyzed relationships signalled by coherence markers. Many of the coherence markers were identical to those identified in the Semantic Potential Theory of Language (Fagan, 1978). Although her findings showed no significant difference in Cloze scores between students who responded to the passages of high, medium, and low coherence marker density, reader ability (good, average, and poor readers) significantly affected the Cloze scores of all students no matter what level of coherence marker density they were responding to.

Townsend and Bever (1978) investigated interclause relations with emphasis on the semantic aspects of conjunctions. The conjunctions in the subordinate clauses were "if", "since", "when", "while", and "though". The meaning of these conjunctions and the kind of organizing strategies they elicit were tested in initial and final positions. Results indicate that the target position of the clause was strongly influenced by its particular conjunction. Their findings confirm Stoodt's (1972) that there is a significant relationship between reading comprenension and comprehension of conjunctions. Her subjects were randomly selected grade four students. The conjunctions "when", "so", "but", "or", "where", "while", "that", and "if" were found to be the most difficult. The easiest conjunctions were "and", "how", "for", and "as".

Based on the Semantic Potential Theory of Language (Fagan, 1978), Forster (1978) also investigated the relationship of referential and

logical text clues and the retention of information of average grade four students. Three passages were developed to reflect varying amounts of referential and logical relations. There were two categories for referential connectives and two for logical connectives. However, with the exception of one category of referential connectives (pronoun, relative pronoun, complementizer, repetition, and synonym), he found there was no significant difference in the recalls across the three passages (Forster, 1978).

Some studies have focussed on examining the developmental patterns in the understanding of connectives. Robertson (1968) investigated fourth, fifth, and sixth grade readers' comprehension of connectives. Many of these were also identical to those contained within the logical relations in the Semantic Potential Theory of Language (Fagan, 1978). The study was carried out in three sections: (a) identification of various types of connectives; (b) construction of a connectives reading test; and (c) analysis of the results of the connectives reading test. Results showed that for each of the seventeen selected connectives, there was an increase in understanding from a lower to a higher grade. Six connectives, "however", "thus", "which", "and", "although", and "yet", were below the comprehension level of the total student group on all test items.

Katz and Brent (1968) who worked with grade one and grade four children found that developmental trends were noted in preference for linking clauses by means of causal as opposed to temporal connectives. Neimark and Slotnick (1970) used children in the third through the ninth grade as well as two groups of college sophomores in their study. In a

sixteen item test of logical connectives administered, the number of correct responses increased with age. Disjunction was more difficult than conjunction and therefore their evidence suggested that "this ability develops throughout the period of formal operations and is not fully attained until late adolescence" (Neimark and Slotnick, 1970, p. 458).

Sternberg (1979) also found that comprehension of different connectives develops at different rates. His subjects were in grades two, four, six, eight, high school, and college. Conjunctions (and) were the easiest, disjunction (or) was of intermediate difficulty, and conditionality (if-then, only-if) and bi-conditionality (if and only if) the most difficult.

Corrigan (1975) and Lawton (1977) focussed only on the development of the causal "because". Their findings were consistent with those of other investigators who found performance to improve with age, corresponding to the change from the pre-operational period to the concrete-operational period of intellectual development.

The findings of Bever (1970), Clark (1971), and Coker (1978), who examined the acquisition of the temporal connectives "before" and "after" by young children up to the first grade level, are contradictory. Although Bever's (1970) and Clark's (1971) findings support the acquisition of "before" prior to "after", Coker's (1978) results showed that understanding of these connectives was acquired at the same time.

Amidon (1976) included children aged five, seven, and nine in her study to assess understanding of temporal and conditional connectives "when", "as soon as", "before", "after", "if", "if-not", "unless", and

"unless-not". These were presented in sentences. After each sentence a "when" or a "what" question was asked to assess understanding of the particular connective. She found a dramatic increase in understanding of connectives between the ages of five and seven. Sentences containing "when", "as", "as soon as", and "if" were understood as early as five years of age. Sentences containing "before", "after", and "if-not" were of intermediate difficulty and sentences containing "unless" and "unless-not" were extremely difficult even at nine years of age (Amidon, 1976).

Although there is growing evidence that inferring connectives is more difficult than understanding them when they are stated explicitly, the findings are contradictory. In Pearson's (1974) study, "children seem not only to be able to handle complexity, but to actually prefer it" (p. 190). However, in Irwin's (1980) study both fifth grade and college level students scored significantly lower on the comprehension of causal relationships when they read passages containing implicit relationships as compared to groups that read passages with explicit causal relationships. Also, junior college students in Marshall and Glock's (1978) study who read explicit "if-then" relationships recalled more of the ideas in the passage than those who read implicit "if-then" relationships.

However, Neilsen's (1978) findings indicated that the presence (explicit) or absence (implicit) of linguistic connectives in passages did not cause comprehension to vary significantly. His subjects were 216 students in grades five and nine who were average or above average in reading ability. They were randomly assigned to one of three experimental tasks; wh-question probes, sentence recognition, and oral

recall. A follow-up study (Neilsen and Braun, 1978) comparing good and poor readers to determine if understanding of abstract relational terms is a factor of reading achievement also revealed no significant effect on performance in passages with and without connectives.

Zinn (1979) focussed on the connective "because" in her study with high and low achievement readers in grade four. "Results suggest that within high and low achievement groups, no significant differences occurred when connectives were absent or present. There were some differences between achievement groups, however, with these differences more apparent when causal connectives were removed from the pasage, than, when they were present" (p. 59).

Synthesis of information in comprehension entails the joining of prior knowledge, knowledge of sentence syntax, and knowledge of word meanings. Some researchers have found that readers are more senstiive to the relationships between informational units that are cued by connectives. However, others have found that there is no significant difference in the comprehension of passages with or without connectives. Thus, the logical relationships may be inferred by the readers even though the connectives are absent. Presenting passages with and without logical connectives to the subjects in this study may yield more substantive data.

Achievement in reading is based on ability to read and comprehend written material. However, as Beebe and Malicky (1980) stated "the role of connectives as a determinant of success in the remedial program...was less clearcut" (in press). This appears to be particularly true of logical perceptual connectives, for they found that "ability to perceive

time and space relationships at entry into the program appeared to be related to children's ability to profit from the instruction provided" (Beebe and Malicky, 1980, in press). There has been little attention given by researchers to the understanding of this specific type of connective in continuous discourse. Based on their research, Beebe and Malicky (1980) suggested that until the relationship of connectives to achievement is clarified, special attention to time and space relationships appears to be merited in remedial reading programs. By focussing on perceptual connectives in discourse and using good and poor readers, this study adds more information as to how comprehension of written material with a specific linguistic variable is related to reading achievement.

On the basis of the developmental studies concerning connectives, it appears that children in Piaget's stage of concrete operations (7-11 years) become quite capable of using and understanding connectives. Therefore drawing subjects from grade four at the elementary level appears to be wise, as they would be in the middle of this stage of intellectual functioning.

Summary

Within the last two decades investigations in reading have shifted from what is comprehended to how it is comprehended. It has been demonstrated that cognitive and linguistic processes are involved in extracting meaning from written material. That connectives aid these processes both as linguistic cues which signal relationships and as

synthesizers of these relationships is also recognized. Recall is emerging as a viable measure of comprehension.

Comprehension ability appears to be related to facility in linguistic processes as revealed by investigators comparing the performance of good and poor comprehenders. However the findings are contradictory and there needs to be more research in this area. It may be that both good and poor comprehenders can discern the relationships of ideas as signalled by linguistic indicators equally well. Contradiction also exists as to whether implicit or explicit connectives in written material affect comprehension of that material. This study adds to the body of available information concerning these areas of reading by comparing the performance of good and poor readers on passages with connectives present (explicit) and with connectives absent (implicit).

Understanding of various types of connectives has also been investigated. Much research has focussed on causal and conditional connectives but few, if any, have focussed exclusively on perceptual connectives which involve time and space relationships in connected discourse. This study does so. The design of the study is presented in the next chapter.

CHAPTER III

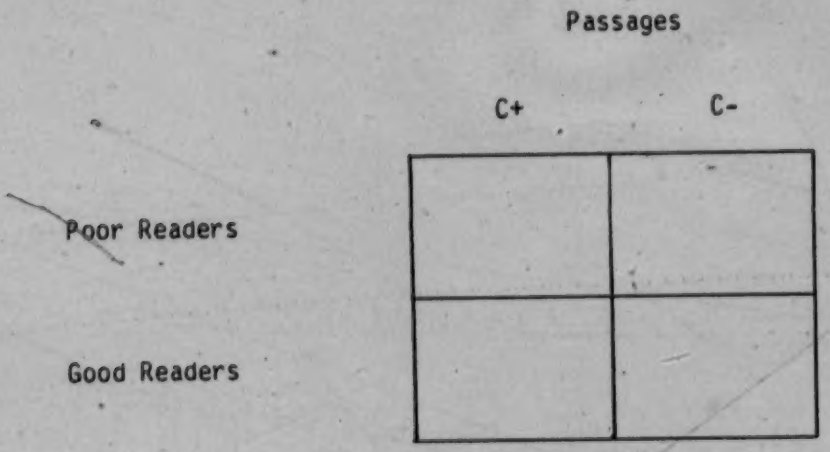
DESIGN OF THE STUDY

Included in this chapter is a description of the experimental design, the selection of the sample, the instruments and procedures used in gathering data, the coding of the data, the pilot study, and the statistical analysis.

The Experimental Design

The design of the study was a two-by-two factorial design with repeated measures on passage types. Since the study investigated the performance of good and poor readers on their use of perceptual connectives and the nature of information recalled, two different passages were administered to each subject for silent reading and recall. One of these passages contained perceptual connectives and the other passage did not. The reading achievement groups and the type of passages are the factors in the design and hence are the independent variables. The dependent variables were text specific units, text entailed units, text erroneous units, text external units, total perceptual connectives, and different perceptual connectives. The following figure presents a summary of the experimental design.

Figure 1. The Experimental Design



Sample Selection

The sample for this study was drawn from the population of five elementary schools within the Edmonton Catholic School District. Forty students were selected according to the following criteria:

(a) Grade Level. Subjects from grade four were selected because the focus in reading at this level is comprehension rather than word identification. Therefore use of text clues such as connectives becomes important. Also, children in this age group are in the concrete stage of operations according to Piaget's stages of intellectual development and become capable of logical thought (Hilgard, Atkinson, and Atkinson, 1979). "Concrete operations consist of a direct organization of immediately given data" (Inhelder and Piaget, 1958, p. 249). These include classification, serial ordering, equalization, and correspondence. Since the concrete operations stage extends from ages seven to eleven, the related aspects of reversibility and coordination of

relationships in time and space should be established. The mean chronological ages were 9.8 and 9.7 for the good and poor reader groups respectively.

(b) Non-Verbal I.Q. Score. The Canadian Lorge-Thorndike Intelligence Test was used to select subjects who were within the average range of intellectual ability. Their scores fell between one standard deviation below the mean and one standard deviation above the mean (85 - 115). The mean I.Q. scores for the good and poor reader groups were 103 and 98.3 respectively. Only the Non-Verbal Battery score was used in the selection of subjects to ensure that the I.Q. score did not reflect reading achievement since the Verbal Battery requires reading in order to do the subtests.

The mean scores of the good and poor groups on the Non-Verbal Battery of the Canadian Lorge-Thorndike Intelligence Test were compared to determine significant differences in intellectual functioning. A t-test for independent means was used. Results are presented in Table 1.

Table 1

T-TEST FOR I.Q. OF READING ACHIEVEMENT GROUPS

Good Readers		Poor Readers				
Mean	SD	Mean	SD	DF	T-Value	P (Two Tail)
98.3	9.246	103.0	8.927	38	-1.64	0.110

The results of the analysis did not reveal any significant differences in intellectual functioning between the two groups of readers. This ensured that intellectual ability was not a factor in differences between the reading achievement groups.

(c) Reading Achievement. Test results of the Gates-MacGinitie Reading Test were also used. Since the nature of information given in free or unaided recall was considered indicative of comprehension in this study, test results from the comprehension section were used to determine the two achievement groups comprised of good and poor readers. Good readers were those subjects whose comprehension test score placed them between the 70th and the 90th percentiles. Poor readers were those subjects whose comprehension test score placed them between the 10th and the 30th percentiles. Those subjects with comprehension test scores below the 10th percentile were excluded to eliminate the possibility of having children in the study who were unable to read the test instruments.

These boundaries were selected to ensure there was a contrast between reading comprehension abilities. The mean comprehension grade score for the good readers was 6.0 and for the poor readers 2.6.

(d) Sex. Although an attempt was made to have an equal number of boys and girls in each achievement group, the poor reader group contained more males than females. There were twelve males and eight females. This was considered a representative sample from the available population because there are more boys who have difficulty in reading. According to Bannatyne (1971) the proportion of boys to girls may range from 3:1 to 10:1. He states "from my own review of the literature and personal experience in schools, clinics, and centers, I have found that the

proportion of boys to girls may range from 3:1 in cases of mild disability up to 10:1 in cases of severe disability" (p. 376). There were ten males and ten females in the good reader group.

(e) English Language Fluency. Subjects with non-English backgrounds who had not achieved fluency and adequate understanding of the English language were excluded. This information was obtained from the teachers and/or principals.

(f) Permission. Parental and child permission was required in order for a child to be included in the sample.

(g) Other Factors. Children with severe speech, hearing, or emotional disorders were excluded from the study.

The non-verbal score on the Canadian Lorge-Thorndike Intelligence Test, the comprehension score on the Gates-MacGinitie Reading Test, the sex, and chronological age of each subject is given in Table 2 for the poor reader group and in Table 3 for the good reader group.

Testing Instruments

Results from the Gates-MacGinitie Reading Test, Level C, Form 2, Canadian Edition (1980) and the Canadian Lorge-Thorndike Intelligence Test, Level B, Form 1 (1967) were used in this study. These results were obtained from official student records which are available from the Administration Centre of the Edmonton Catholic School District and are kept at each school. The Gates-MacGinitie Reading Test was administered in June, 1980 and the Canadian Lorge-Thorndike Test was administered in October, 1980 by classroom teachers.

Table 2

BACKGROUND INFORMATION ON POOR READERS

Subject	Sex	Comprehension Grade Score (Gates-MacGinitie)	Non-Verbal I.Q. Score (Lorge-Thorndike)	C.A. (April, 1981)
01	M	2.4	108	10.1
02	F	2.7	102	11.1
03	F	2.6	98	9.11
04	M	2.4	95	9.7
05	F	2.9	93	8.6
06	M	2.4	106	9.11
07	M	2.3	115	9.6
08	M	2.9	91	9.5
09	F	3.1	112	9.2
10	M	2.7	87	9.9
11	M	2.4	90	9.7
12	F	2.5	93	10.1
13	F	2.9	106	9.3
14	M	2.6	85	9.9
15	M	2.5	96	9.8
16	F	2.4	93	9.2
17	M	3.1	109	9.9
18	M	2.6	85	9.10
19	F	2.9	108	9.6
20	M	2.7	94	10.0
Mean		2.6	98.3	9.7

Table 3

BACKGROUND INFORMATION ON GOOD READERS

Subject	Sex	Comprehension Grade Score (Gates-MacGinitie)	Non-Verbal I.Q. Score (Lorge-Thorndike)	C.A. (April, 1981)
21	M	5.6	94	9.5
22	F	6.6	113	9.2
23	F	5.6	112	9.5
24	F	6.6	110	9.6
25	F	6.1	105	9.6
26	F	5.6	104	10.1
27	F	6.1	92	9.9
28	M	6.1	109	9.4
29	M	5.3	90	10.8
30	M	6.6	102	10.4
31	M	5.3	108	9.10
32	M	5.6	90	9.11
33	M	6.6	115	10.1
34	F	6.6	92	9.3
35	F	6.6	108	10.0
36	M	5.6	97	10.3
37	M	6.6	112	9.6
38	F	5.6	89	9.10
39	M	6.6	108	9.11
40	F	5.3	110	10.2
Mean		6.0	103	9.8

Reading Achievement

To obtain a measure of each subject's reading achievement, results from the Gates-MacGinitie Reading Test Level C, Form 2, Canadian Edition (1980) were used. This test consists of two parts, vocabulary and comprehension. Only the results from the Comprehension Subtest were used.

The Comprehension Subtest measures ability to read prose passages with understanding. Following each passage are two questions and four alternate answers for each question. The correct answers are to be selected.

The Canadian Edition of the Gates-MacGinitie Reading Test is based on the Second Edition of the Gates-MacGinitie Reading Test published in 1978 in the United States. The 1978-1979 Canadian norms were developed from the results of testing 46,000 students throughout the ten provinces and the Yukon. To assure test validity all items were examined by a group of Canadian educators for their appropriateness to Canadian education; vocabulary words were selected from words in sixteen commonly used reading series for grades one, two, and three; content of comprehension passages was chosen for the knowledge and interests of students according to a plan that specified the proportion of natural science, social science, humanities, and narrative material for each test; and approximately twice the number of items needed for literal and inferential questions were written to test understanding of the passages and after an extensive tryout, only items of appropriate difficulty and usefulness were chosen.

Kuder-Richardson Formula 20 reliability coefficients were computed for each test level from the Canadian standardization data. The K-R 20

coefficients ranged from 0.85 to 0.94 for Vocabulary and from 0.85 to 0.92 for Comprehension.

Intellectual Functioning

To obtain a measure of each subject's intellectual functioning, results from the Canadian Lorge-Thorndike Intelligence Test, Level B, Form 1 (1967) were used. This test consists of a Verbal and Non-Verbal Battery. Only the results from the Non-Verbal Battery were used in the sample selection.

The Non-Verbal Battery contains pictorial or numerical items. There are three subtests involving pictorial classification, pictorial analogy, and numerical relations.

The test was normed on a stratified random sample of 31,739 students in grades three to nine from across Canada. Validity was established by correlating the results of the Canadian Lorge-Thorndike Test with the results of individually administered tests such as the Stanford-Binet Intelligence Scale and Weschler Intelligence Scale for Children. The odd-even reliability for Levels A-F of the Verbal Battery ranges from 0.830 to 0.945 and from 0.894 to 0.931 for the Non-Verbal Battery. The intercorrelations between Verbal and Non-Verbal Batteries for Levels A-F range from 0.558 to 0.681.

The Experimental Test Instruments

Construction of the Instrument

Two passages from the Standard Reading Inventory Test (McCracken) (1966) were selected and modified. These passages were at a grade three

level to ensure that the poor readers would not be reading at frustration level. The passages were selected from the Standard Reading Inventory Test (McCracken) because they are representative of the type of material that children read in school and are designed to assess comprehension by unaided recall after both oral and silent reading.

Content validity was obtained by vocabulary control; sentence length, content, and general style based upon three basal reading series; and Spache Readability Formula and the Dale-Chall Formula for Predicting Readability. This was corroborated by testing 664 children.

To obtain reliability Forms A and B of the Standard Reading Inventory Test (McCracken) were administered to sixty children divided equally among grades one through six. Pearson product-moment correlations between eight areas of reading achievement ranged from 0.68 to 0.99 and between reading levels from 0.86 to 0.99.

The content of the passages was narrative in nature. Each passage was rewritten so that in one version the perceptual relationships were explicitly indicated by perceptual connectives. The connectives "where", "when", "while", "until", "after", "before", "then", and "as" were used. This selection was based on the temporal disjunction, temporal conjunction and location categories in the Semantic Potential Theory of Language (Fagan, 1978) which are described in Appendix C. Since the effects of relational order of clausal units on recall was not a variable in this study, the connectives were used in initial position clauses as well as in final position clauses. In the other version of each passage, the perceptual connectives were removed.

Each set of the same modified passage (+ perceptual connectives, - perceptual connectives) contained the same information and the same

number of clausal units. The passage titled "A Gift" contained 19 clausal units, and seven perceptual connectives. The passage titled "A Trip" had 26 clausal units, and eight perceptual connectives. (See Appendix A for complete passages.)

Administration of the Instrument

Each subject was asked to read silently one passage without connectives and the other passage with connectives. There were no time restrictions. Following the silent reading of each passage, subjects were requested to give an unaided recall, i.e. to tell all they could remember about the story. Each administration was done on an individual basis in a quiet setting and the responses were tape recorded for transcription.

In order to control for order effects of passage type, subjects in each reading achievement group were randomly assigned to four subgroups for test administration.

Table 4

ADMINISTRATION OF TEST INSTRUMENTS

Group	Order of Presentation	
A	A Gift (C-)	A Trip (C+)
B	A Trip (C+)	A Gift (C-)
C	A Gift (C+)	A Trip (C-)
D	A Trip (C-)	A Gift (C+)

C+ Perceptual Connectives present.
C- Perceptual Connectives absent.

Coding of Data

After the unaided recalls were transcribed, the recall protocols were analyzed as based on analyses by Drum and Lantoff (1977) and Fagan (1978, 1980). The protocols were also analyzed for the total number of perceptual connectives used as well as the number of different perceptual connectives used by each subject.

The sentences in the passages were divided on the basis of syntactic criteria into mazes and clausal units. The clausal unit was chosen because it is easier to judge if synthesis of information has occurred within this unit than it is to do so within a smaller unit. A clausal unit was considered as a group of words containing a subject (or implied subject) and a predicate term, with one or more modifiers if applicable, which formed part of a compound or complex sentence; or which was a simple sentence. Compound subjects and/or predicates were also divided and considered as separate linguistic units. In addition incomplete clausal units were included in the analysis. They generally lacked a subject, a verb, or both, and served to specify particular information, elaborate an antecedent, make additional comments, or establish a referent for an ambiguous item (Fagan, 1980). These units were categorized according to their semantic equivalents.

A maze consisted of audible noise (uh, er, etc.), the repetition of words or parts of words, or an edit (a jumble of words preceding a change in direction of what the person was about to say) (Fagan, 1980). Mazes were not included for analysis.

Each clausal unit was compared to the input text and assigned according to its semantic content to one of the following types of informational units: text specific, text entailed, text erroneous, or text external (Fagan, 1980). In Table 5 each informational unit is defined and then further explained by means of examples taken from the protocols in the study.

Fagan's (1980) text experiential category (C) was subsumed into the text entailed category as very few clausal units fell into this category and the nature of text experiential information (having experiences related to the theme of the text passage, or from the reader's knowledge of the world) was considered as synthesis of background knowledge and textual information. The remaining categories (text specific, text entailed, text erroneous, and text external) were recently subjected to regression analysis to determine if they are effective in predicting silent reading achievement scores (Malicky, Beebe, and Fagan, 1981). The subjects involved were 95 grade four students.

It was found that the scores on the Canadian Test of Basic Skills were significantly influenced by the number of text entailed units and text erroneous units given in recalls. Comprehension scores were higher if there were more text entailed information units recalled; and comprehension scores were lower if there were more text erroneous information units recalled. The data provide some indication of the validity for using this system to analyze recall protocols as a measure of the strategies which readers use to gain meaning when reading.

To assure reliability of the coding of the data by the researcher, an independent judge also analyzed ten percent of the recalls for

Table 5

EXAMPLES OF RECALL INFORMATIONAL UNITS

A. Text Specific. Information which is recalled verbatim from the text or is synonymous with text information.

A1. Verbatim Recall. Verbatim recall of clausal units in text.

A2. Substitution of Pronouns. Substitution of pronouns if the referent is present in the text.

Text: Eddie's bicycle had a flat tire.
Protocol: It had a flat tire. (Subject 19)

A3. Synonymy of Elements. Synonymy of elements in clausal units of text.

Text: Henry hurried home.
Protocol: Henry rushed down home. (Subject 11)

Text: They discovered that Eddie's bicycle had a flat tire.
Protocol: They noticed that the tire was flat. (Subject 13)

A4. Partial Recall. Partial recall of clausal units in text.

Text: They each packed some sandwiches for lunch.
Protocol: They packed a lunch. (Subject 25)

B. Text Entailed. Information which is put together in new ways and additions of text related information that is semantically entailed by the text, or is an inference. This category includes appropriate synthesis of information.

B1. Summary/Synthesis. A statement that relates information from at least two units in the text in an embedded form where some of the units of information are deleted, or is a summary of at least two units of information from the text.

Text: ...they decided to fix the tire. They pushed Eddie's bicycle to a gas station and waited until the man fixed it.
Protocol: So they went to a garage to fix it. (Subject 2)

Text: He rushed downtown and he bought some film at the drugstore.
Protocol: First Henry went to the store to get some film. (Subject 29)

Table 5 (Continued)

EXAMPLES OF RECALL INFORMATIONAL UNITS

B2. Inference. Inference entailed by text.

Text: Henry hurried home. His parents were waiting for him.
Protocol: Then he went and told his parents and they liked what he did. (Subject 32)

Text: He put the film in the camera.
Protocol: He put some film in the camera and shut up the back. (Subject 31)

D. Text Erroneous. Information which the reader has confused or combined erroneously. This also includes errors in dates, proper names, or other words.

D1. Errors. Errors in dates, names, or other words are given.

Text: Eddie and Frank were happy. They wanted to visit the airport.
Protocol: Henry and Frank were going to the airport. (Subject 25)

D2. Erroneous Expansions/Additions. Erroneous expansions or additions of information.

Text: Then two men darted into the street waving guns.
Protocol: First Henry saw that there was some kids or people. (Subject 14)

D3. Incorrect Summary/Synthesis. Information which is combined erroneously or is an inaccurate summary.

Text: He said that Henry would be rewarded.
Protocol: He rewarded him. (Subject 26)

E. Text External. Information which is so general that it may not have a specific relationship to the text or is a convention of oral recall.

E1. Vague Generalization. A vague term or statement occuring as a convention of oral recall which has no specific referent in text.

Text: They each packed some sandwiches for lunch.
Protocol: Then they packed some sandwiches and everything. (Subject 31)

Table 5 (Continued)

EXAMPLES OF RECALL INFORMATIONAL UNITS

E2.	Story Telling Conventions. Statements that relate to the conventions of telling a story, concerned with narrating rather than content, or story telling conventions that relate to experiential situations. Text: His parents gave him a camera. He was very excited. Protocol: He was excited because it was I think it was his birthday. (Subject 4) Text: They wanted to visit the airport and watch the planes land and take off. Protocol: They wanted to go to see the airport you know. (Subject 20)

division into clausal units and assignment to categories according to type of informational unit. Interrater agreement was calculated by using the Arrington Formula (Feifel and Lorge, 1950) which is presented below:

$$\frac{2 \times \text{Agreements}}{(2 \times \text{Agreements}) + \text{Disagreements}}$$

The percentage agreement between the researcher and the independent judge was 97.87 for the clausal units and 92.70 for the recall informational units.

Pilot Study

A pilot study was conducted in March, 1980 to ensure that the grade three modified passages from the Standard Reading Inventory Test (McCracken) were at instructional level for the poor readers. At instructional level the reader still "has enough difficulty to require instruction" but does not demonstrate "various behaviors which impede reading success" (Guszak, 1978, p. 119). At this level about 90-95 percent accuracy in word recognition and about 70-75 percent accuracy in comprehension is accepted.

Three subjects (two females and one male) in grade four attending school in the Edmonton Catholic School District were selected according to the criteria outlined for sample selection. The school participating in the pilot study was not involved in the study.

The subjects were presented with two different passages. In one of these passages the perceptual connectives were included, in the other they were removed. Each subject was requested to read each passage

orally and then to give an unaided recall. This was done on an individual basis. The recalls were tape recorded and recall protocols transcribed for analysis into clausal units and the number perceptual connectives given. This information determined the sensitivity of the instrument for collecting data.

The subjects were asked to read the passages orally so that their miscues could be recorded while they were oral reading in order to determine instructional level. The same criteria was used as suggested in the Standard Reading Inventory Test (McCracken) for the number of miscues permissible at the grade three level. On the basis of the results obtained, the instructional level of the passages for the poor readers was established as appropriate. Analyses of the protocols revealed that descriptive sentences not directly related to characters or actions in the story narrative were not recalled. Therefore the passages were modified again to contain only relevant information.

Statistical Analysis

The Division of Educational Research Services at the University of Alberta assisted with the statistical analysis of the data. The statistical treatment of the data involved a two-way analysis of variance with repeated measures across the two passages (ANOV26 Program). This was used to test the hypotheses set for the study.

To get the means, standard deviations and correlations among the variables the DEST 02 Program was used. The t-test program (ANOV 10) for

independent means was used to determine whether there was a significant difference between the groups based on their I.Q. scores.

Summary

In summary, a sample of forty grade four subjects was selected from five schools in the Edmonton Catholic School District. Twenty were good readers and twenty were poor readers. They were selected and assigned to the reading groups according to results of the Comprehension Subtest on the Gates-MacGinitie Reading Test, Level C, Form 2, Canadian Edition administered in June, 1980. The Non-Verbal Battery results on the Canadian Lorge-Thorndike Intelligence Test, Level B, Form I were also used.

Two different passages at the grade three level from the Standard Reading Inventory Test (McCracken) were modified so that in one version of each passage perceptual connectives were included and in the other version the connectives were excluded. To counterbalance the order of administration of the passages, subjects were placed into subgroups randomly. Each subject was individually tested. Responses were tape recorded and transcribed for analysis. Each recall protocol was divided into clausal units and the units were then categorized according to type of informational unit (text specific, text entailed, text erroneous, or text external). Recalls were also analyzed for the total number of perceptual connectives as well as the number of different perceptual connectives given by each subject.

A pilot study conducted in March, 1980 was helpful in refining the testing instruments and in determining the feasibility of using the passages in the study. Statistical analysis of the data involved correlations, *t*-test for independent means, and two-way analysis of variance.

CHAPTER IV

FINDINGS OF THE STUDY

This chapter examines the data obtained from the sample of grade four students attending schools within the Edmonton Catholic School District. The results of three types of statistical treatments are presented: (a) the correlations between the variables are given; (b) the null hypotheses are restated from Chapter 1, followed by tables giving a summary of the analysis of variance on the basis of which the hypotheses are or are not rejected; and (c) the mean scores for the categories of recalled information are included. The level of significance for this study was set at .05.

This chapter is organized into two sections: (a) Performance of Reading Achievement Groups for the Nature of Information Recalled; and (b) Performance of Reading Achievement Groups for the Connectives Recalled.

The data for the correlations are presented in Table 6. This table shows correlations among the following twelve variables: connectives, different connectives, text specific units, text entailed units, text erroneous units, and text external units for the passage without connectives, and for the passage with connectives, respectively. There were sixteen significant correlations at the .05 level or less. Although

Table 6

CORRELATION COEFFICIENTS BETWEEN DEPENDENT VARIABLES AND TYPES OF PASSAGES

VARIABLES	1(C-)	2(C-)	3(C-)	4(C-)	5(C-)	6(C-)	7(C+)	8(C+)	9(C+)	10(C+)	11(C+)	12(C+)
1 (C-)	1.000	0.678**	-0.351*	0.494**	-0.098	-0.186	0.393*	0.103	-0.154	0.102	0.221	-0.065
2 (C-)		1.000	-.0195	0.344*	-0.118	-0.331*	0.313*	0.238	-0.185	-0.014	-0.000	-0.190
3 (C-)			1.000	-0.045	-0.018	0.111	-0.083	0.068	0.025	0.240	-0.199	0.117
4 (C-)				1.000	0.015	0.225	0.434**	0.351*	0.053	0.490**	0.274	0.186
5 (C-)					1.000	0.032	0.202	0.282	0.062	0.024	0.168	0.081
6 (C-)						1.000	0.342*	0.276	0.447**	0.113	0.246	0.360*
7 (C+)							1.000	0.737**	0.265	0.501**	0.157	0.180
8 (C+)								1.000	0.268	0.555**	-0.071	0.222
9 (C+)									1.000	0.153	-0.202	0.213
10 (C+)										1.000	-0.218	0.164
11 (C+)											1.000	0.223
12 (C+)												1.000

* $p < .05$
** $p < .01$

LEGEND

1. Total Connectives
2. Different Connectives
3. Specific Units
4. Entailed Units
5. Erroneous Units
6. External Units
7. Total Connectives
8. Different Connectives
9. Specific Units
10. Entailed Units
11. Erroneous Units
12. External Units

C- Passage Without Connectives

C+ Passage With Connectives

the cause of these relationships cannot be determined from correlational analysis, they will be used to raise a number of questions and/or speculations regarding results of data pertaining to the hypotheses presented in this chapter.

Performance of Reading Achievement Groups for the Nature of Information Recalled

Hypotheses 1, 2, 3, and 4 were formulated to assess significant differences in the comprehension of good and poor readers on passages with perceptual connectives present and passages with these connectives removed. Results were analyzed with two-way analysis of variance with repeated measures across passages to determine differences in the nature of information recalled on the two types of passages.

Results

The four hypotheses formulated to assess differences between the achievement groups and types of passages for the nature of information recalled are presented below.

Hypothesis 1

For the number of text specific units recalled, there is no significant:

(a) main effect of reading achievement groups.
(b) main effect of types of passages.
(c) interaction between reading achievement groups and types of passages.

Hypothesis 2

For the number of text entailed units recalled, there is no significant:

(a) main effect of reading achievement groups.
(b) main effect of types of passages.

(c) interaction between reading achievement groups and types of passages.

Hypothesis 3

For the number of text erroneous units recalled, there is no significant:

(a) main effect of reading achievement groups.
(b) main effect of types of passages.
(c) interaction between reading achievement groups and types of passages.

Hypothesis 4

For the number of text entailed units recalled, there is no significant:

(a) main effect of reading achievement groups.
(b) main effect of types of passages.
(c) interaction between reading achievement groups and types of passages.

The results of two-way analysis of variance to test these hypotheses are presented in Tables 7 to 10. The nature of information recalled by the good and poor readers after reading passages with and without connectives was compared to see if there were significant differences in their comprehension of the textual information. The data revealed no significant differences between the groups for information recalled in any of the categories (text specific, text entailed, text erroneous, or text external). The type of passage read (C-, C+) also had no significant effect on the comprehension of the two reading groups. The test for the presence of interaction of the independent variables (types of readers and types of passages) revealed no significant interaction. Therefore Hypotheses 1, 2, 3, and 4 could not be rejected.

The mean scores for the informational units given in the recalls are presented in Table 11. A study of Table 11 shows that the mean

Table 7

ANALYSIS OF VARIANCE FOR TEXT SPECIFIC UNITS RECALLED

N = 40 Source of Variation	SS	DF	MS	F	P
Reading Achievement Groups	18.051	1	18.051	3.693	0.062
Passage Types	1.250	1	1.250	0.245	0.623
Interaction	0.200	1	0.200	0.039	0.844

Table 8

ANALYSIS OF VARIANCE FOR TEXT ENTAILED UNITS RECALLED

N = 40 Source of Variation	SS	DF	MS	F	P
Reading Achievement Groups	14.448	1	14.448	1.078	0.306
Passage Types	0.791	1	0.791	0.168	0.684
Interaction	0.811	1	0.811	0.173	0.680

Table 9

ANALYSIS OF VARIANCE FOR TEXT ERRONEOUS UNITS RECALLED

N = 40 Source of Variation	SS	DF	MS	F	P
Reading Achievement Groups	6.612	1	6.612	3.186	0.082
Passage Types	1.013	1	1.013	0.631	0.432
Interaction	1.513	1	1.513	0.943	0.338

Table 10

ANALYSIS OF VARIANCE FOR TEXT EXTERNAL UNITS RECALLED

N = 40 Source of Variation	SS	DF	MS	F	P
Reading Achievement Groups	0.013	1	0.013	0.025	0.875
Passage Types	0.313	1	0.313	1.309	0.260
Interaction	0.113	1	0.113	0.471	0.497

Table 11

MEAN SCORES OF THE READING ACHIEVEMENT GROUPS FOR THE NATURE OF INFORMATION RECALLED

Achievement Group	Text Specific Units		Text Entailed Units		Text Erroneous Units		Text External Units	
	C-	C+	C-	C+	C-	C+	C-	C+
Poor Readers	4.00	3.65	8.05	7.65	1.70	1.65	.35	.40
Good Readers	4.85	4.70	8.70	8.70	.85	1.35	.25	.45

C- passage without connectives
C+ passage with connectives

number of text entailed units given in the retelling was greater than that for any other type of informational unit. This was followed by text specific units, text erroneous units, and text external units, respectively.

Discussion of the Results

Complete understanding of text depends on the ability of the reader to detect, interpret, and synthesize relationships between informational units. This study was designed to examine the differences in the understanding or comprehension of textual information of good and poor readers on two types of passages. Since Hypotheses 1, 2, 3, and 4 could not be rejected, this suggests that the reading achievement groups did

not differ in abstracting information from the text or in text organization processes. Passage types also did not affect the comprehension of the information read by these achievement groups. It appears then that both good and poor readers used similar comprehension strategies regardless of the type of passage read (C- or C+).

These findings support Ryan and Semmel's (1969) and Sullivan's (1973) conclusions that all types of readers appear to use the same strategies in organizing and relating information. They state that a reader uses his knowledge of language and the context in testing hypotheses about the information in the text rather than reacting passively to each unit. Goodman (1976) similarly called reading a "psycholinguistic guessing game". In this model of reading a reader utilizes knowledge of background experiences, language, and the task at hand to select cues, associate meaning with them, and synthesize the information in text with this prior knowledge. Comprehension is impaired if prior knowledge is inadequate to enable the reader to be an active reader.

In this study, the passages were selected to be at an instructional level for the poor readers so that they would have adequate understanding of the task. A pilot study confirmed that the passages were at an appropriate instructional level for the poor grade four readers; thus they were able to be active readers and reconstruct the meaning of the connected discourse. This may account for the finding that both types of readers processed information similarly.

The importance of determining every child's reading level has been emphasized by writers such as Barbe (1961), Betts (1969), Bond and Tinker

(1973), and Harris and Sipay (1975). However, it appears that in differentiating cognitive abilities of good and poor readers on comprehension tasks, few studies, if any, have controlled for material to be at instructional level. In addition, most studies comparing good and poor readers have assessed level of comprehension, whereas this study differs in that it assesses the nature of comprehension of good and poor readers.

Studies such as Cromer's (1970), Weinstein and Robinovitch's (1971), and Isakson and Miller's (1976) contrasted good and poor readers to compare their syntactic/semantic processing of information. They concluded that there was a difference between the two groups in their ability to make use of syntactic/semantic cues in the sentence structures and that poor comprehenders have difficulty perceiving relationships between the words in a passage and integrating them into a meaningful whole. However, the data in this study revealed that there was no difference in the ability of good and poor readers to understand relationships between information units denoted by perceptual connectives. It is possible that their findings may have been replicated in this study if the passages selected had not been at instructional level for the poor readers.

Specific to assessing the nature of comprehension processes in this study was the understanding of logical relationships in discourse. That good and poor readers understand logical relationships equally well supports the findings of Miller and Hosticka (1978) and Neilsen and Braun (1978). Their studies had also compared good and poor readers in their understanding of logical connectives.

As was done in this study, Neilsen and Braun (1978) also had assessed passage effects (with and without connectives) on the readers' comprehension of connectives. Their findings were confirmed in this study. Subjects were able to understand logical relationships in discourse regardless of whether they were implicit or explicit in passage context. Thus as Neilsen (1978) had concluded, "the presence or absence of linguistic connectives in the surface structure of text does not affect the comprehension of interpropositional relationships in the microstructure (passage content) of text" (p. 9). This suggests that logical relations are encoded as part of a schemata embodied in discourse and can be inferred if they are absent.

Pearson's (1974) data support findings that the cognitive process of synthesis is integral in comprehension. He concluded that "at least with respect to causality, people store data in unified rather than discrete units" (p. 187). As in Pearson's (1974) study where causal relations were synthesized, so in this study logical perceptual relationships were synthesized by the subjects.

Table 11 gives the mean scores for each type of informational unit. Although differences between means were not statistically tested, the table indicates that there were more text entailed units than other types of units given in the recalls. The text entailed unit is indicative of information put together in new ways, addition of text related information that is semantically entailed by the text, or inferences. It included appropriate synthesis of information. Therefore it appears that the readers' comprehension of passage material was both abstractive and constructive (Gomulicki, 1956; Bransford and Johnson,

1972; Fredericksen, 1975; Kintsch and van Dijk, 1978; Tierney, Bridge, and Cera, 1979). This was true for both good and poor readers.

Performance of Reading Achievement Groups for the Connectives Recalled

Hypotheses 5 and 6 were formulated to determine the significance of differences in the total number and the number of different perceptual connectives generated in the unaided recalls by good and poor readers after passages with and without connectives were read. Results were analyzed by the statistical measure of two-way analysis of variance with repeated measures across passage types.

Results

The two hypotheses to assess differences between the groups and types of passages for the total number and the number of different perceptual connectives recalled are presented below.

Hypothesis 5

For the total number of perceptual connectives recalled, there is no significant:

(a) main effect of reading achievement groups.
(b) main effect of types of passages.
(c) interaction between reading achievement groups and types of passages.

Hypothesis 6

For the number of different perceptual connectives recalled, there is no significant:

(a) main effect of reading achievement groups.
(b) main effect of types of passages.
(c) interaction between reading achievement groups and types of passages.

Table 12

ANALYSIS OF VARIANCE FOR
TOTAL NUMBER OF PERCEPTUAL CONNECTIVES RECALLED

N = 40 Source of Variation	SS	DF	MS	F	P
Reading Achievement Groups	0.450	1	0.450	0.079	0.780
Passage Types	20.000	1	20.000	8.038	0.007**
Interaction	0.450	1	0.450	0.181	0.673

** p. < .01

Table 13

ANALYSIS OF VARIANCE FOR
THE NUMBER OF DIFFERENT PERCEPTUAL CONNECTIVES RECALLED

N = 40 Source of Variation	SS	DF	MS	F	P
Reading Achievement Groups	0.050	1	0.050	0.069	0.795
Passage Types	11.250	1	11.250	24.152	0.000**
Interaction	0.050	1	0.050	0.107	0.745

**p. < .01

Table 14

FREQUENCY OF PERCEPTUAL CONNECTIVES RECALLED

Connective	C- Passage	Connective	C+ Passage	Connective	Total
then	69	then	81	then	150
when	9	when	14	when	23
while	3	until (till)	11	until (till)	12
after	2	after	7	after	9
until (till)	1	before	4	before	5
where	1	where	4	where	5
as	1	as	3	as	4
before	0	while	2	while	4

C- passage without perceptual connectives
C+ passage with perceptual connectives

Data pertaining to Hypotheses 5 and 6 are presented in Tables 12 and 13. In addition, Table 14 indicates the frequency of perceptual connectives in the passages with and without connectives.

Differences between the reading achievement groups and between the types of passages read were assessed for the perceptual connectives recalled. Hypotheses 5a and 6a were not rejected indicating that there was no significant main effect of reading achievement groups on the total number or the number of different perceptual connectives recalled.

Hypotheses 5b and 6b were rejected. Therefore the types of passages had a significant effect on the total number as well as the number of different perceptual connectives recalled.

Hypotheses 5c and 6c were not rejected. Thus it can be concluded that the interaction between types of readers and types of passages on the total number and the number of different perceptual connectives was not significant.

It can be noted from a study of Table 14 that proportionally to other connectives given in the recalls, "then" was used about four to one times more often than other connectives after the reading of the passage without connectives. However, use of "then" was approximately half the number of other connectives given in the recalls after the reading of the passages with connectives.

Discussion of the Results

According to the data, there was no significant difference between the achievement groups on generation of perceptual connectives in the recalls. Both good and poor readers used these connectives in their recalls after reading both types of passages. Katz and Brent (1968) had found that from ages 6-7 and 11-12 there is a marked increase in ability to clearly verbalize causal and temporal relationships. In this study nine year old children, whether they were good or poor readers, appeared to have the ability to verbalize temporal and spatial relationships. They were also able to verbalize relationships denoted by other types of connectives, but since these are not the focus of this study, they are not reported.

Although connectives were used by both achievement groups in their recalls after reading each type of passage, the type of passage read had a significant effect on the number of perceptual connectives produced.

More perceptual connectives were recalled when the passage with explicitly stated connectives was read. Thus the presence of connectives cued ability to remember them and facilitated their use in the production of more complex sentences.

In readability research, sentence length and complexity contribute to comprehension difficulty (Pearson, 1974). Use of explicitly stated connectives in the C+ passage did increase the complexity of sentence structure. In this study, however, comprehension of the C+ passage was not affected for either the good or the poor readers.

The total number of perceptual connectives produced and the number of different perceptual connectives produced in the recalls were highly correlated across both types of passages (C- passage: .678, $p. < .01$; C+ passage: .737, $p. < .01$). Thus the more connectives given in the recall, the more likely that there were more different connectives given. These two variables are not clearly distinct.

That there is a significant relationship between understanding of connectives and comprehension has been postulated by Stoodt (1972), Neilsen (1978), Beebe and Malicky (in press). In this study the relationship of perceptual connectives and comprehension of connected discourse was investigated. The nature of information as most indicative of the understanding of logical relationships in discourse is the text entailed information unit. While causation cannot be established by the correlation of connectives given in the recall and text entailed units, it can be said that a significant positive relationship exists (Table 6). The correlation between the total number of connectives and text entailed units; and the number of different connectives and text entailed

units, related to the C- passage is .494 ($p. < .01$) and .344 ($p. < .01$), respectively. As related to the C+ passage, the correlation between the total number of connectives and text entailed units is .501 ($p. < .01$), while the correlation between the number of different connectives and text entailed units is .555 ($p. < .01$).

Summary

No significant differences were found between achievement groups or types of passages for the nature of information recalled. However, there was a significant difference between the types of passages read, with or without connectives, for the total number of perceptual connectives and the number of different perceptual connectives recalled.

Since implicit (C- passage) or explicit (C+ passage) perceptual connectives did not cause performance between the achievement groups to vary significantly, spatial and temporal relationships were comprehended by the good and the poor readers regardless of which type of passage was read. Presence of the connectives in the passages did, however, facilitate increased use of them in the recalls.

CHAPTER V

SUMMARY, CONCLUSIONS AND IMPLICATIONS, AND SUGGESTIONS FOR FURTHER RESEARCH

The major purposes of this study were to compare good and poor readers' comprehension of connected discourse with and without perceptual connectives and their use of these connectives in verbal recalls. Perceptual connectives aid in synthesizing temporal and spatial relationships.

Summary of the Study

The sample consisted of forty subjects in grade four attending schools within the Edmonton Catholic School District. They were selected on the basis of comprehension scores on the Gates-MacGinitie Reading Test, Level C, Form 2, Canadian Edition and the non-verbal scores on the Canadian Lorge-Thorndike Intelligence Test, Level B, Form 1. I.Q. was held constant and the subjects were divided, according to their comprehension scores, into two equal groups of good and poor readers. Comprehension scores of the good readers were between the 70th and the 90th percentiles; whereas the poor readers' scores were between the 10th and the 30th percentiles.

Each subject was individually tested using two passages of different content. Passages were used because analysis was concerned

with relationships between and across sentences. One passage was constructed with perceptual connectives present, while the other passage had no perceptual connectives. Each subject was asked to read the passages silently. After each passage was read, the subject was requested to give an unaided recall. The unaided recalls were tape recorded and later transcribed into protocols for analysis, first into clausal units and then according to type of information recalled. Recalls were also analyzed for the perceptual connectives given.

Statistical measures used to analyze data included a t-test for independent means, correlations, and two-way analysis of variance with repeated measures.

Major Findings

Results of the analysis of variance revealed the following findings.

1. There were no significant differences between reading achievement groups for the number of text specific units recalled, the number of text entailed units recalled, the number of text erroneous units recalled, or the number of text external units recalled.

2. There were no significant differences between types of passages for the number of text specific units recalled, the number of text entailed units recalled, the number of text erroneous units recalled, or the number of text external units recalled.

3. There were no significant interaction effects between reading achievement groups and types of passages for the number of text specific units recalled, the number of text entailed units recalled, the number of

text erroneous units recalled, or the number of text external units recalled.

4. There were no significant differences between reading achievement groups for the total number of perceptual connectives recalled or the number of different perceptual connectives recalled.

5. There were significant differences between types of passages for the total number of perceptual connectives recalled and the number of different perceptual connectives recalled. When connectives were present in the passage, more connectives were given in the recall.

6. There were no significant interaction effects between reading achievement groups and types of passages for the total number of perceptual connectives recalled and the number of different perceptual connectives recalled.

Further analysis of the data gathered in this study revealed that there were more text entailed information units given in the recalls than other types of units (text specific, text erroneous, or text external). There was also a positive significant correlation between text entailed units and use of perceptual connectives. Although the connective "then" was used the most often in the recalls, more different perceptual connectives were given after the C+ passage was read.

Conclusions and Implications

This study provided further evidence that reading comprehension involves abstraction and construction processes. This implies cognitive and linguistic processing and reliance on background knowledge.

Abstractive processing involves selecting relevant information units from the text and synthesizing the units into a meaningful whole. Constructive processing involves the reader in using information from the text along with his/her background knowledge to construct (or reconstruct) a meaningful interpretation of the text.

Some studies (Cromer, 1970; Weinstein and Robinovitch, 1971; Isakson and Miller, 1976) have found that poor comprehenders possess less ability than good comprehenders to organize text. However, this finding was not supported in this study. Since the passages were selected to be at the instructional level for the poor readers, this may account for the findings that there were no processing differences between the good and poor readers. If this is so, then there are crucial implications for the study of process differences, i.e. how readers interact with print, and for classroom instruction.

Researchers must be careful that conclusions regarding differences in comprehension processes are not caused by having the poor readers at frustration level. Teachers should ensure that basic reading instruction is provided at an appropriate level as this appears to be crucial in reconstructing meaning of text successfully. Informal reading inventories (McCracken, 1966; Betts, 1972; Silvaroli, 1977) which make use of materials of increasing difficulty would be helpful to teachers to make structured observations of reading behavior in an actual situation to determine an appropriate reading level for each child.

Logical connectives are difficult to define because their meaning comes from their linkages with other words and concepts. Therefore they are important to language in terms of their relational meaning and if not understood will hamper comprehension. In this study, the focus was on

the comprehension of perceptual connectives in written language. Results showed no difference between the good and poor readers' understanding and use of them. The subjects in this study used them effectively to synthesize time and space relationships in the passage. This may be because the passages were carefully selected so they could interact meaningfully with the information. Grade four students, according to Piaget's stages of development, can understand logical relations. In this study, they did when material was at their instructional level.

Although use of explicitly stated connectives resulted in longer, more complex sentences, both good and poor readers were able to comprehend the passages. Therefore this raises implications for reexamining the readability factors in instructional materials. Sentence length particularly needs to be reviewed.

The type of passage read (with and without connectives) influenced the subjects' use of connectives in the recalls. Because connectives are synthesizers between informational units, increased use of them in passages should result in more text entailed informational units being given in recalls. Although causality cannot be inferred, there was a positive correlation between use of perceptual connectives and text entailed units. It appears, then, that there is value in using connectives in written material. Children can use them as aids to synthesize the information. In addition, when connectives are stated in passages, children generate a greater variety of connectives in recalls. This results in finer meaning distinctions between informational units.

By analyzing a protocol and comparing it to the input text, it is possible to find out what information a subject understands and remembers

in order to generate the recall. Telling someone about what one reads requires reflection and an organization into a sequence that forms a unified whole. The results of this study support use of recall for both research and the classroom.

Retelling used as a research tool for measuring comprehension elicits what is important to the subject and can be used to reconstruct the processing operations applied to the text. Retelling as an instructional technique focusses the child's attention on getting meaning from the text at the same time that cognitive and linguistic abilities are operating in processing meaning. Retelling, unlike questioning techniques, measures what is important to the child. Using retelling as a measure of comprehension may also result in improvement of oral language skills. This may translate into an improved facility for writing skills.

This study was based on the Semantic Potential Theory of Language (Fagan, 1978) and, overall, the results support both the use of recall and recall categories (Fagan, 1980) as viable techniques for examining reading comprehension. In addition, the subjects in this study did produce the connectives identified in Fagan's logical connectives categories in their recalls. Also, use of these connectives did differentiate between performance on passage types. Hence support for the theory was generated in this study. However, it should also be noted that the variables identified in the theory did not differentiate between good and poor readers.

Suggestions for Further Research

As the findings of this study indicated no apparent differences in text processing between good and poor readers, this study has raised more questions than it has answered regarding the development of comprehension processing strategies, for example: Will syntactic/semantic factors be a problem only when content is unfamiliar or when it is not at instructional level? At what point do readers use linguistic cues such as connectives to comprehend syntactic structures that are unfamiliar? It may be warranted to find out what types of syntactic structures do in fact create difficulty for readers at specific stages of development. Information about what causes readers to "break down" and be unable to synthesize the details of discourse relationships would lead toward more effective instruction and development of appropriate instructional materials.

Studies examining differences in discourse processing between good and poor readers might include background knowledge and/or stage of cognitive development as variables. Miller and Hosticka (1978) state that "if a developmental trend is supported reading researchers might be persuaded to more closely examine the Piagetian theory of cognitive development in relation to reading comprehension ability" (p. 293). Also, background knowledge would appear to be a crucial variable in the written information. It may be that good and poor readers differ in extent and/or use of background knowledge when involved in a comprehension task.

The process by which children acquire meaning distinctions among connectives in continuous discourse is not well understood. Results of this study showed that both good and poor readers in grade four understood and used the connectives investigated in this study. These results, however, may be representative only of the population from which the sample was drawn. Therefore this study should be replicated to include readers whose comprehension scores are below the 10th percentile for a comparison of results.

Since this study is among the first to focus on perceptual connectives in continuous discourse, the study of the development of comprehension of perceptual connectives, particularly in written language, across grade levels is warranted. Further studies focussing on the relationship between use of connectives and synthesis of information are also warranted.

Traditionally children have been asked to read orally in classrooms and oral reading as an indicator of "a good reader" is open to challenge. In this study the subjects were required to read the passages silently. A replication of the study requiring subjects to read orally may yield different results, since processing of text may be different in oral reading. More research contrasting oral and silent reading processes may benefit classroom teachers.

Finally, the results of this study provide direction for researchers to reexamine readability formulae. Perhaps different criteria are necessary.

Concluding Statement

This study was an attempt to identify comprehension processing differences between good and poor grade four readers and to investigate their understanding of perceptual connectives. There was no difference in the comprehension of passages, whether connectives were implicit or explicit, between the good and the poor readers. Therefore, results appear to justify the conclusion that for both good and poor readers, reading comprehension requires an active, attentive, and selective reader who interacts with the text to extract and reconstruct meaning. An important variable contributing to being this type of reader appears to be the adjustment of material to an appropriate reading level. This provides direction for the teaching of comprehension strategies, particularly in relation to remediation efforts.

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APPENDICES

APPENDIX A

INSTRUCTIONS TO SUBJECTS AND TEST PASSAGES

INSTRUCTIONS TO SUBJECTS

Instructions before the passages were read:

I am going to give you two short stories to read. I would like you to read the stories silently or to yourself. You have to read the stories by yourself and you can take as long as you want to read each story. When you have finished reading a story, I want you to tell me about what you have read. Tell me all that you can remember about the story.

This story is called "A Gift" (or "A Trip")

Instructions after each passage was read:

Now tell me about what you have read. Tell me all that you can remember about the story. (The only prompt that was given was "Is that all?" or "Is there anything else?")

PASSAGE 1 (C-)

A GIFT

Henry liked to take pictures. His parents gave him a camera. He was very excited. He rushed downtown and he bought some film at the drugstore. He put the film in the camera. An alarm bell sounded. Two men darted into the street waving guns. Henry took three pictures. They jumped into a car and disappeared in the traffic. Henry was excited about taking the pictures. He decided to go to the police station and tell Policeman Wilson. Policeman Wilson was delighted. He said that Henry would be rewarded. Henry hurried home. His parents were waiting for him.

PASSAGE 1 (C+)

A GIFT

Henry liked to take pictures. He was very excited when his parents gave him a camera. He rushed downtown to the drugstore where he bought some film. Just after he had finished putting the film in the camera, an alarm bell sounded. Then two men darted into the street waving guns. Henry took three pictures as they jumped into a car and disappeared in the traffic. While Henry was still excited about taking the pictures, he decided to go to the police station and tell Policeman Wilson. Policeman Wilson was delighted. He said that Henry would be rewarded. Henry hurried home where his parents were waiting for him.

PASSAGE 2 (C-)

A TRIP

It was Saturday morning. Eddie and Frank were happy. They wanted to visit the airport and watch the planes land and take off. It was eleven miles to the airport so they decided to ride their bicycles. They each packed some sandwiches for lunch and they left. They did not know the way but they looked at the side of the road and they saw some signs. They rode for about an hour. Suddenly Eddie hit a bump on the edge of the road. He tumbled to the ground and he hurt his leg. They discovered Eddie's bicycle had a flat tire. Eddie and Frank thought about going home but they decided to fix the tire. They pushed Eddie's bicycle to a gas station and waited. The man fixed it.

PASSAGE 2 (C+)

A TRIP

Eddie and Frank were happy when it was Saturday morning. They wanted to visit the airport where they could watch the airplanes land and take off. It was eleven miles to the airport so they decided to ride their bicycles. Before they left, they each packed some sandwiches for lunch. They did not know the way but they looked at the side of the road where they saw some signs. They rode for about an hour when suddenly Eddie hit a bump on the edge of the road. He hurt his leg as he tumbled to the ground. Then they discovered Eddie's bicycle had a flat tire. Eddie and Frank thought about going home but they decided to fix the tire. They pushed Eddie's bicycle to a gas station and waited until the man fixed it.

APPENDIX B

SAMPLE OF ANALYZED RECALL

PASSAGE 1 (C-)

A Gift

/ Henry (like) he liked (A) to take pictures / and his (uh) mom (B); and dad bought him (B) a camera / and then (B) he went downtown to the drugstore to get some film / and then (B) he went downtown to take some pictures / and when (B) he was walking through the door / (uh) two men (B) came out / and they had guns in their hands (B) / and (uh) he took (A) three pictures of them / and then (B) they went into the car (B) / and then (B) he went to the policeman / and he told about them (B) / and then (D) he got a reward / and he started home (B) / (cause it) cause (B) he thought / his parents would get worried (B); or something (E) /

Analysis of Data:

Clausal Units : 17

Recall informational units:

A - Text Specific Units	A - 2
B - Text Entailed Units	B - 13
D - Text Erroneous Units	D - 1
E - Text External Units	E - 1

Total Connectives: 6

Different Connectives:

"then" - 5

"when" - 1

APPENDIX C

TEMPORAL AND SPATIAL CONNECTIVES

Temporal and Spatial Connectives

Temporal Disjunction

One event happens either before or after another event. Words such as "before", "after", "then", are used to express this relationship.

After he studied French, John did his math problems.

John washed the dishes, then took out the trash.

Before he took out the trash, John washed the dishes.

Temporal Conjunction

An event happens at the same time as another event. Commonly used words for this are "while" and "when".

While I am sweeping the porch, Mary will wash the car.

Location

Events are placed in a spatial framework. The word "where" is used most frequently in expressing this relationship.

He went where the boat was docked.

He hid where the cook kept his things.